not throw any light upon the *mode of origin* of that group.

The chamæleons have, as we have seen, their main home in Madagascar. That island is also the main home of another very exceptional group, the exceptional group of beasts called lemurs. But lemurs have much resemblance, though probably no true affinity, with apes, and the apes are a group, even more isolated perhaps than lemurs. It is as yet quite impossible to say from what root the ape order took its origin.

The same thing may be said (and a few weeks ago was said by our president in this room) respecting the cetaceans, the order, that is, of whales and porpoises. The same thing again may be said of that very exceptional order of flying beasts, the bats. The chamæleon family then is only one of many others which have this at present quite isolated character. But if we can obtain no clue as to the chamæleon's origin, can we detect any special or unexpected affinities between it and any other creatures which do not belong to its own class, the class of reptiles?

It is now very generally supposed that birds have been derived from reptiles, and there seem to have been two distinct lines of descent—the ostrich kind of birds, from extinct land reptiles called *Dinosauria* (of which the great *Iguanodon* of the Wealden formation is a type) and the other birds from extinct flying reptiles called *Pterosauria*, which had much analogy with our bats. This double origin (which I advocated ten years ago) has recently been reinforced by investigations of Prof. Vogt with respect to that extinct feathered creature of the Oolite, the *Archeopteryx*, which turns out to have many affinities with the Pterosauria.

Now the chamæleon has no resemblance either to the Dinosaurian or to the Pterosaurian reptiles, and certainly nothing could well be less bird-like in appearance or in habits than the chamæleon. The one only point of resemblance—that between its pincer-like feet and those of the parrots—is but a very incomplete one, as we have already seen. Nevertheless there is one strange and unexpected structural character already noted to which it may be interesting to revert.

In birds the lungs (unlike our own and those of beasts) are not closed bags, but communicate with air-sacs which extend far and wide within the body, and which doubtless facilitate their powers of aërial locomotion. In the most active lizards, which dart so quickly to their shelter that the eye cannot follow them, there is nothing of the kind; neither is there in those little lizards which take such long jumps with the help of their parachute-like wings, that they may be said to flit—lizards called by the absurdly formidable name of "flying dragons;" yet in the chamæleon, in spite of its sluggishness, such sacs are present, and thus render unavailing a character which might otherwise be employed to distinguish all birds from all existing reptiles.

But though neither comparative anatomy nor palæontology yet enables us to speculate profitably on the origin of the chamæleon's family, there is one feature met with in many of the species which tends to shed a certain amount of light on principles of variation, and therefore on that of specific origin generally. I refer to the circumstance that so many kinds of chamæleons develop crests, processes, or horns on the muzzle and over the eyes or on the occiput. These outgrowths are so different one from another that it is impossible to believe that they have arisen by inheritance and descent from any one peculiarity of the kind. Superciliary prominences could not give rise to nasal protuberances, or bony outgrowths to true horn-sheathed excrescences, and none of these could either be the parents or the offspring of occipital flaps.

The phenomenon is parallel to what we find in certain groups of birds, as *e.g.*, the birds of paradise, so many kinds of which develop unusual feathery outgrowths—these outgrowths being often so different in nature that they cannot be supposed to have been derived by inheritance one from another.

In such birds then we must admit (as I have long ago urged) that there exists an innate tendency to unusual outgrowths of feathers of one or another kind, and similarly we must admit that there is extant in the nature or essence of chamæleons a tendency to osseous or horny outgrowths from the head of one or of another kind. It has been suggested that these outgrowths in the males are due to the wayward fancy of female chamæleon taste. And certainly the female chamæleon, with her exceptional power of independently moving her eyes, and so simultaneously considering and accurately comparing the horns and warts of two rival swains, is unusually qualified for making a careful matrimonial choice. Seriously speaking, however, I regard this explanation as quite inadequate.

I have elsewhere[1] given my reasons for considering this explanation to be a mistaken one, but the question is far too wide to discuss to-day, suffice it to say that even if this hypothesis were correct it would but imply the presence of an innate tendency in the female to admire horny and warty prominences of certain varied kinds. The one innate tendency is as mysterious, and when deeply considered as significant as in the other.

But apart from these questions, which, however interesting they may be, are still matters of uncertain speculation, the actual structure and the unquestionable facts of the chamæleon's physiology are, as I trust you will now agree with me in saying, matters of very great interest. They offer fields as yet unexplored for careful observation and experiment. Even the most peculiar and important of all the chamæleon's actions—the emission and retraction of its tongue—are actions which, so far as I know, are not by any means clearly understood. But when to such matters of direct observation or immediate inference we add the problems to the solution of which elaborate reasoning has to be employed—reasoning based on wide knowledge of the structures of animals existing and extinct—it will, I think, be evident that the leisure of a long life might be usefully devoted to obtaining a complete and far-reaching knowledge of the natural history of that exceptional family of Lacertian reptiles, the family of the chamæleons.

THE INTERNATIONAL MEDICAL CONGRESS

THE seventh meeting of the International Medical Congress, which has just been held in London, has been remarkable from many points of view. The sudden growth of the Congress from an assembly of 600 to one of over 3000 members, the truly cosmopolitan character of the gathering, the great scientific activity displayed, the lavish private and public hospitality and marked Royal patronage conferred, have one and all marked out this meeting as a very great event. It has been the largest and most complete assembly of scientific men that this age, and therefore any age, has ever witnessed, and if the results to science should prove to be at all commensurate, it will be a very prominent event in the history of the progress of science.

The many and complicated arrangements have been admirably planned by Mr. MacCormac and his able assistant, Mr. Makins, and they have borne successfully the heavy strain of a larger number of members than was previously expected. The Congress has held six general meetings, at each of which an address has been delivered, and the more special work has been conducted in the fifteen sections among which it has been split up. Sir James Paget, as President, delivered the opening address on Wednesday last, which was characterised by his usual

[1] "Lessons from Nature," Chap. X. (Murray, 1876).

eloquence and scientific ability. He did not confine himself to any one subject, but glanced at the progressive character of science, the need for the work of all varieties of minds, and the aim and purpose of science as applied in the medical arts. On the same afternoon Prof. Virchow discussed the value of pathological experiment in an address displaying the most thorough grasp of his subject and vigour of thought and diction; he attacked the opponents of vivisection for their utter inconsistence, and gave a very weighty protest against their claim to regulate the pursuit of knowledge. The French address was to have been read by Prof. Raynaud of Paris, but his sudden death only a few days before the meeting prevented this arrangement being carried out, and the address he had already prepared was read by his friend, M. Féréol: it dealt with the subject of the right sphere of action, and the influence of scepticism in medicine. On Saturday Dr. Billings gave a masterly address on Medical Literature; his tables showed a most alarming growth in the production of volumes and periodicals during the past ten years, but he was able to give some consolation by the statement that the rate of growth had of late shown some slackening: his wise and witty remarks on book-writing, bibliography, cataloguing, and reference were especially valuable as coming from a man of considerable experience in these matters, and applying equally to all varieties of literature. On Monday, Prof. Volkmann, one of Mr. Lister's most ardent disciples in Germany, gave an address on Modern Surgery, which resolved itself into a review of the progress and results of antiseptic surgery. He was followed by Prof. Pasteur, who in a few moments described his latest experiments, and announced results which promise to have as important effects for useful animals as Jenner's vaccination has for man. The final general meeting was held on Tuesday last, when Prof. Huxley addressed the Congress on the Connection of the Biological Sciences with Medicine, tracing this connection from step to step, and pointing out the necessity for a similar close union in the future. The entertainments during the week have been many and brilliant, including, in addition to many partly private, a soirée at South Kensington Museum, a dinner at the Mansion House, reception at the Guildhall, reception by Earl and Lady Granville, *conversazione* at the College of Surgeons, and informal dinner at the Crystal Palace. Notwithstanding all these diversions the real hard work that has been done every day by the great mass of the members of the Congress has been very great, and this, and the free interchange of ideas in conversation of many workers in the same part of the field of science, must be productive of good, both by its direct effect and by the stimulus to work it must afford. Among the many subjects discussed, the germ theory and its various practical bearings and outcomes, have had a prominent share. In the Surgical section there was a debate on the treatment of wounds, in which it was incidentally raised, and there appeared to be a general consensus of opinion that particulate germs play an all-important part in the production of wound diseases, though there was by no means such agreement as to the best means of treating wounds. In the Pathological section a long and very animated discussion was introduced by Prof. Klebs, who discussed the relations of minute organisms to certain specific diseases. Dr. Charlton Bastian supported his well-known views, and was opposed by Lister, Virchow, Pasteur, Hueter, Cheyne, and Roberts, and it was made abundantly evident that the germ theory of disease has not only established itself firmly in the faith of scientific pathologists, but that its importance is becoming wider and greater with rapid strides. By far the most valuable of all the communications bearing upon this subject was M. Pasteur's account of his recent "vaccination" experiments. He has found that by a special mode of cultivation of the poison of chicken cholera he can obtain an attenuated or weakened virus, and that vaccination with this attenuated virus, which merely causes slight and transient local mischief, protects fowls completely from the most active virus for a certain time, and enables them to resist the disease for a far longer period. He has also demonstrated that the source of the attenuation of the virus is the action of atmospheric oxygen, for it is only when the "germs" are allowed to develop in the presence of abundance of oxygen that the containing fluid becomes less intensely poisonous. A "vaccine" for splenic fever or charbon could not be obtained in this manner, but if the virus be allowed to develop in a solution at a temperature of 42°—43° C., with free exposure to the air, it quickly becomes less active, and ultimately, at the end of a few weeks, dies. Experiments on sheep have shown that vaccination with this "attenuated lymph" protects the animal from the action of the purer and more active poison. But great as will be the value of these researches, even if only applied to the two diseases in question, it is far more important to notice their extreme importance from a scientific point of view. First of all they explain in part the action of oxygen in preventing septic infection, and the inflammatory complications of wounds. But they also excite the hope, and go far towards showing that it is not improbable, that by some special form of cultivation every disease-virus may be thus attenuated and a poison result, which if inoculated will produce only a transient local change, but will protect from the virulent form of the disease as completely as efficient vaccination protects from small-pox. Prof. Pasteur referred to the germ theory of disease as one which has ceased to number the practical triumphs it has won; and every day is giving results to add to its importance and value.

NOTES

Mr. W. H. M. Christie, F.R.S., First Assistant at Greenwich Observatory, has been appointed Astronomer Royal, in succession to Sir George Airy, who retires after holding the office for nearly half-a-century.

On October 17 next, fifty years will have elapsed since Prof. Bunsen, the eminent chemist, received his doctor's diploma from Göttingen University. He, however, intends to absent himself from Heidelberg on the day in question, in order to avoid all congratulations and speech-making.

Mr. W. A. Forbes, B.A., Fellow of St. John's College, Cambridge, Prosector to the Zoological Society, has been appointed Lecturer on Comparative Anatomy at Charing Cross Hospital, *vice* the Rev. J. F. Blake, removed to Nottingham.

The discussion in connection with Mr. Mundella's able statement on the Education Estimates had no special bearing on the teaching of science in elementary schools. Steps are evidently being taken to make elementary education more and more efficient, to give those whose school years are short and precious every opportunity of acquiring a knowledge of things that will be really useful to them in after life. It is clear from the facts and figures, as well as the tone of Mr. Mundella's address, that the education of the country is safe in his hands. In the proposals for the revision of the Code laid on the table of the House are several changes for the better. In infant schools, for example, part of the course provided for is a systematic one of simple lessons on objects and on the phenomena of nature and common life. Among the "Class Subjects" in boys' and girls' schools are Physical Geography and Elementary Science, and among the specific subjects are Mechanics, Animal Physiology, Botany, Principles of Agriculture, and Domestic Economy. This is all in the right direction, and is just what we should expect from an Education Minister like Mr. Mundella.

Mr. Mundella stated on Monday that Prof. Leone Levi has prepared an elaborate report on technical education in Italy,